Treatment versus Comparison Group Pre-Post Gains on Teaching & Technology Indices
Spring 2007 simMentoring Data
June 22, 2007

Introduction

This report contains an analysis of pre-post trends in data gathered to evaluate simMentoring preservice teacher education activities during the spring of 2007. Other data such as faculty observations, web log entries, trends in usage, and system modifications/enhancements, are addressed in other documents. Three groups of preservice teacher candidates who provided pre-post assessment data during spring 2007 are featured in this report.

Description of Treatment and Comparison Groups

During the spring of 2007, simSchool was introduced to 32 preservice teacher candidates in one section of EDRE 4860 Reading and Language Arts, a methods course for Professional Development School phase 1 (PDS 1) students. These students were in EC-4 or 4-8 teacher preparation programs. Students at this intern stage which precedes student teaching, spent two days per week taking courses and two days per week in a classroom observing teacher and student activities and assisting the classroom teacher. Pre-post instruments assessing teaching beliefs, perceived level of teacher preparation, level of technology proficiency, level of technology integration, and attitudes toward computers were administered at the beginning and end of the class.

Pre-post data were also gathered from a parallel section of EDRE 4860 (30 students), taught by the same instructor, but not incorporating simSchool. This group was targeted as the comparison group for the simMentoring treatment class.

In addition, pre-post data were gathered from a second comparison group in the teacher preparation curriculum. These students were enrolled in EDSE 3830 (26 students), Teaching/Learning Process and Evaluation, a junior-level course in the preparation sequence. No exposure to simSchool was provided to these students.

Findings

EDRE 4860 Treatment Classroom

As shown in Table 1, there were large pre-post gains on several constructed assessments. Note the especially large gain in Instructional Self-Efficacy (ES = .95).

Table 1.
Treatment Classroom Using SimSchool, EDRE 4860 Spring 2007

Measurement Indices		N	Mean	Std. Dev.	Signif	Cohens d
TPSA - Email	Pre	29	4.66	0.37	0.07	0.49
	Post	25	4.83	0.30		
	Total	54	4.74	0.35		
TPSA WWW	Pre	29	4.54	0.40	0.36	0.25
	Post	25	4.65	0.42		
	Total	54	4.59	0.41		
TPSA Integrated Applications	Pre	29	4.21	0.81	0.04	0.55
	Post	25	4.60	0.52		
	Total	54	4.39	0.71		
TPSA Teaching with Technology	Pre	29	4.11	0.63	0.09	0.47
	Post	25	4.43	0.69		
	Total	54	4.26	0.67		
CBAM Levels of Use	Pre	29	4.97	1.15	0.00	0.91
	Post	25	6.08	1.04		
	Total	54	5.48	1.23		
Stages of Technology Integration	Pre	29	5.07	0.88	0.96	0.01
	Post	25	5.08	0.91		
	Total	54	5.07	0.89		
ACOT	Pre	29	3.41	0.95	0.02	0.63
	Post	25	3.96	0.68		
	Total	54	3.67	0.87		
Instructional Self Efficacy	Pre	28	4.81	0.40	0.00	0.95
	Post	23	5.23	0.40		
	Total	51	5.00	0.45		
Locus of Control	Pre	29	3.49	0.79	0.37	-0.25
	Post	25	3.30	0.78		
	Total	54	3.40	0.78		
Teaching Skill	Pre	28	4.73	0.56	0.00	1.00
	Post	23	5.35	0.52		
	Total	51	5.01	0.62		
Sim Importance	Pre	29	3.66	0.86	0.47	0.19
	Post	25	3.84	1.03		
	Total	54	3.74	0.94		

EDRE 4860 Comparison/Control Group (same instructor as previous section).

As shown in Table 2, there was also growth in technology proficiency and teaching skills within the comparison group classroom taught by the same instructor as the treatment group. Note there was not a significant gain in "Instructional Self Efficacy" for this group.

Table 2.
Comparison Group Classroom Using SimSchool, EDRE 4860 Spring 2007 (Same Instructor as Treatment Classroom)

Measurement Indices		N	Mean	Std. Deviation	Signif.	Cohens d
TPSA - Email	Pre	29	4.80	0.30	0.29	0.29
	Post	26	4.88	0.28		
	Total	55	4.84	0.29		
TPSA WWW	Pre	29	4.58	0.38	0.17	0.37
	Post	26	4.72	0.39		
	Total	55	4.65	0.39		
TPSA Integrated Applications	Pre	29	4.34	0.66	0.05	0.53
	Post	26	4.68	0.60		
	Total	55	4.50	0.65		
TPSA Teaching with Technology	Pre	29	4.22	0.57	0.02	0.63
	Post	26	4.58	0.52		
	Total	55	4.39	0.57		
CBAM Levels of Use	Pre	29	5.03	1.64	0.00	1.03
	Post	26	6.58	0.76		
	Total	55	5.76	1.50		
Stages of Technology Integration	Pre	29	5.14	0.83	0.01	0.67
	Post	26	5.65	0.56		
	Total	55	5.38	0.76		
ACOT	Pre	29	3.66	0.90	0.05	0.52
	Post	26	4.08	0.63		
	Total	55	3.85	0.80		
Instructional Self Efficacy	Pre	29	4.88	0.75	0.14	0.40
	Post	25	5.17	0.67		
	Total	54	5.01	0.72		
Locus of Control	Pre	28	3.20	0.63	0.80	0.07
	Post	25	3.26	0.95		
	Total	53	3.23	0.79		
Teaching Skill	Pre	25	4.82	0.59	0.00	0.96
	Post	22	5.45	0.57		
	Total	47	5.11	0.65		
Sim Importance	Pre	29	4.07	0.96	0.15	0.39
	Post	26	4.42	0.81		
	Total	55	4.24	0.90		

EDSE 3830 Second Comparison Group

As shown in Table 3, there were significant gains in several technology proficiency areas among the students in the second comparison class. However, there was little (i.e. non-significant) gain in "Instructional Self Efficacy" for this group.

Table 3.
Second Comparison Group Classroom (not Using SimSchool), EDSE 3830 Spring 2007 (Different Instructor)

Measurement Indices		N	Mean	Std. Deviation	Signif.	Cohens d
TPSA - Email	Pre	29	4.68	0.45	0.09	0.58
	Post	12	4.92	0.18		
	Total	41	4.75	0.40		
TPSA WWW	Pre	29	4.40	0.51	0.06	0.65
	Post	12	4.73	0.46		
	Total	41	4.49	0.51		
TPSA Integrated Applications	Pre	29	4.18	0.90	0.11	0.55
	Post	12	4.63	0.44		
	Total	41	4.32	0.81		
TPSA Teaching with Technology	Pre	29	3.83	0.84	0.10	0.57
	Post	12	4.34	0.94		
	Total	41	3.98	0.89		
CBAM Levels of Use	Pre	29	4.76	1.48	0.09	0.58
	Post	12	5.67	1.67		
	Total	41	5.02	1.57		
Stages of Technology Integration	Pre	28	4.50	1.35	0.01	0.92
	Post	12	5.67	0.49		
	Total	40	4.85	1.27		
ACOT	Pre	29	3.38	1.02	0.05	0.65
	Post	12	4.08	1.08		
	Total	41	3.59	1.07		
Instructional Self Efficacy	Pre	29	4.47	0.79	0.91	0.04
	Post	12	4.50	0.90		
	Total	41	4.48	0.81		
Locus of Control	Pre	29	3.59	0.63	0.63	-0.17
	Post	11	3.45	1.06		
	Total	40	3.55	0.76		
Teaching Skill	1	28	4.47	0.95	0.03	0.81
	2	10	5.23	0.68		
	Total	38	4.67	0.95		
Sim Importance	1	28	3.86	0.89	0.13	-0.54
	2	12	3.33	1.16		
	Total	40	3.70	0.99		

Figure 1 graphically illustrates the magnitudes of the gains in different areas among the treatment, comparison 1, and comparison 2 groups of preservice students. Gains were much larger for the treatment group in the area of Instructional Self Efficacy.

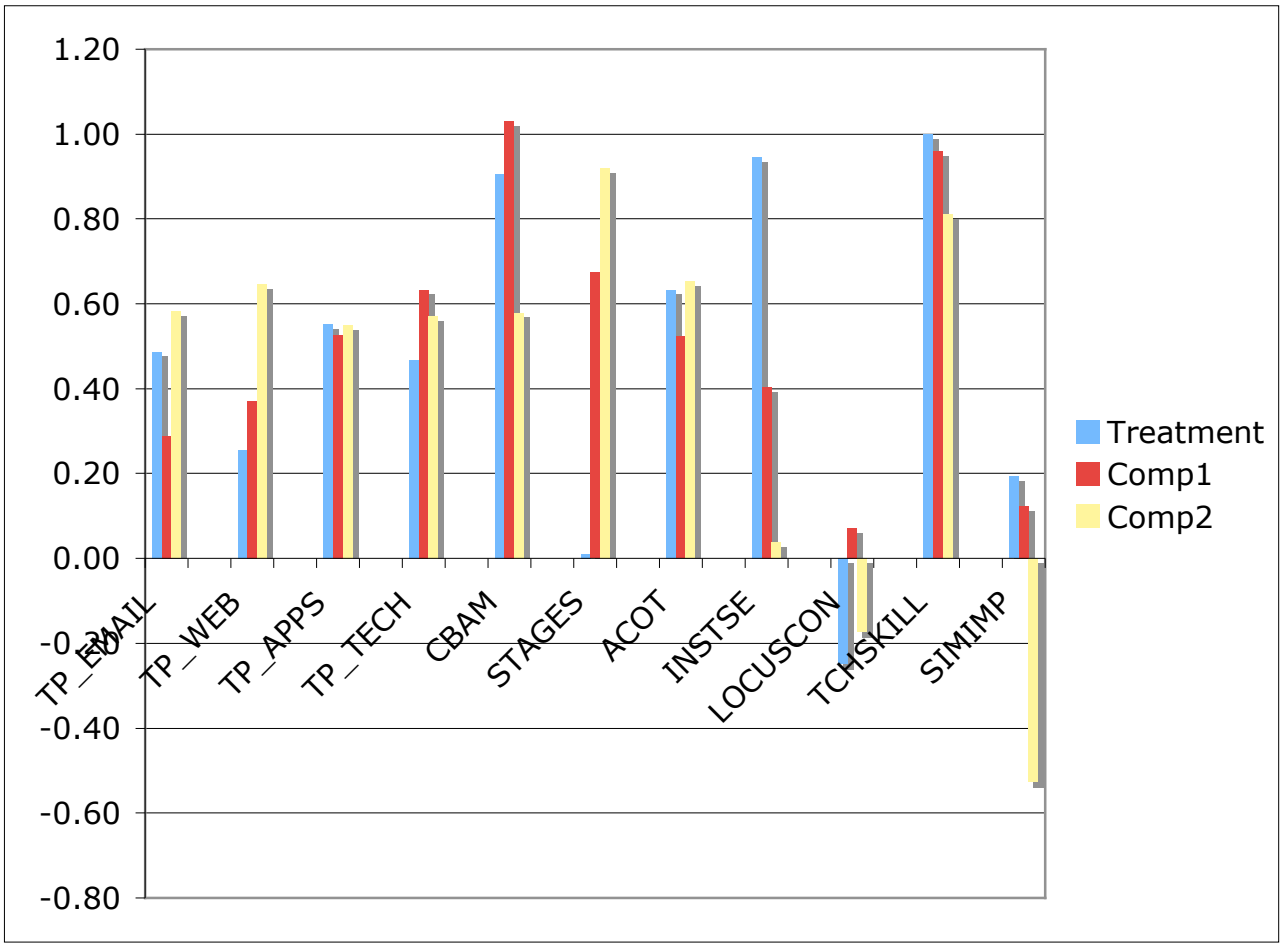

Figure 1. Comparison of pre-post effect size indices for 11 indicators of technology and teaching among treatment and comparison groups of preservice educators, Spring 2007.

Discussion

Instructional Self Efficacy is a scale derived through exploratory factor analysis of the 10 "perception of teaching" items on Teacher Preparation Survey (see Appendix A). These items were adapted from Riedel (2000). Two factors with eigenvalues greater than 1.0 were extracted by a principal components, varimax rotation procedure. Post hoc internal consistency reliability (Cronbach's Alpha) for the following five items loading on Factor 1, which was named Instructional Self-Efficacy, was found to be Alpha = .72. This is in the range of 'respectable' according to guidelines provided by DeVellis (1991). The items composing this scale are:

- TSP 1I. If I really try hard, I can get through to even the most difficult or unmotivated students.

- TSP 1G. If a student in my class becomes disruptive and noisy, I feel assured that I know some techniques to redirect him/her quickly.

- TSP 1C. When I really try, I can get through to most difficult students.

- TSP 1H. If one or more of my students couldn't do a class assignment, I would be able to accurately assess whether the assignment was at the correct level of difficulty.

- TSP 1F. If a student did not remember information I gave in a previous lesson, I would know how to increase his/her retention in the next lesson.

The remaining five items formed the second factor, labeled Home/School Locus of Learning Control. Post hoc analysis of internal consistency reliability for the scale produced from items loading on this factor was found to be Alpha = .57. This lower reliability would be deemed unacceptable (below .6) according to guidelines provided by DeVellis (1991). The items composing this scale are:

- TSP 1D. A teacher is very limited in what he/she can achieve because a student's home environment is a large influence on his/her achievement.

- TSP 1J. When it comes right down to it, a teacher really can't do much because most of a student's motivation and performance depends on his or her home environment.

- TSP 1B. If students aren't disciplined at home, they aren't likely to accept any discipline.

- TSP 1E. If parents would do more for their children, I could do more.

- TSP 1A. The amount a student can learn is primarily related to family background.

A second factor analysis was conducted on the fifteen items in part 2 of the Teacher Preparation Survey. These items ask the respondent to indicate how well prepared he/she currently feels for each teaching skill. The single item in part 3 of the survey was included in this analysis as well. The result was a two-factor solution with all 15 of the teaching skill items loading on factor 1, while the single item about perceived importance of computer games or simulations for K-12 students for learning, loaded on factor 2. Post hoc internal consistency reliability analysis for the 15-item factor produced a Cronbach's Alpha value of .97. This is beyond "very good" according the guidelines provided by DeVellis. The fifteen items composing the Teaching Skills scale are:

a. Describing the teaching context.
b. Stating objectives clearly.
c. Stating objectives so they are aligned with goals.
d. Selecting objectives aligned with student needs.
e. Selecting varied and complex objectives.
f. Selecting a broad array of teaching strategies.
g. Sequencing teaching strategies.
h. Allotting time for instruction realistically.
i. Developing high-quality adaptations.
j. Developing a wide array of adaptations.
k. Interpreting on-task behavior accurately.
l. Interpreting assessment results accurately.
m. Connecting teaching and learning.
n. Analyzing my own teaching performance.
o. Making decisions based on the assessment results from my students.

Note that since the item in part 3 loaded on its own factor and formed a single-item scale, it is not possible to estimate internal consistency reliability for this scale. This item is:

- Part 3: To what extent do you think computer games or simulations can be an important learning tool for K12 students?

There were no significant pre-post changes in the group mean ratings on this item for either the treatment or comparison groups (see last lines in Tables 1, 2 and 3).

Conclusion

Preservice teacher preparation candidates involved in the simMentoring project at the University of North Texas during the spring of 2007 exhibited moderate to large gains (Cohen, 1988) on many of the 11 teacher preparation, technology proficiency, and technology integration indices produced from the data. The area in which the treatment group of preservice teacher candidates exhibited the largest gain in comparison to the two groups of their peers that did not receive simSchool access and training, was on items related to instructional self-efficacy. Pre-post effect sizes (Cohen's d) for the treatment versus two comparison groups on this indicator were treatment ES = .95 ($p < .0005$), comparison group one ES = .40 ($p = .14$), and comparison group two ES = .04 ($p = .91$). Items composing this indicator reflected preservice educators' confidence in their competence to bring about positive learning outcomes even in less-than-ideal learning conditions. Findings imply that simMentoring activities were successful in fostering instructional self-efficacy in preservice students. Further research is needed to confirm or refute this assertion.

References

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum Associates.

DeVellis, R.F. (1991). *Scale development*. Newbury Park, NJ: Sage Publications.

Riedel, E. (2000). Teacher Beliefs & Preparation Survey. Univ. of Minnesota: Center for Applied Research and Educational Improvement.